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Editors

Geotechnics for Natural Disaster Mitigation and Management

 Springer

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ISSN 2364-5156 ISSN 2364-5164 (electronic)
Developments in Geotechnical Engineering
ISBN 978-981-13-8827-9 ISBN 978-981-13-8828-6 (eBook)
<https://doi.org/10.1007/978-981-13-8828-6>

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Preface

Indian Geotechnical Society (IGS) and Japanese Geotechnical Society (JGS) made an agreement of cooperation to promote and enlarge the exchange of technical, scientific and professional knowledge related to geotechnical engineering. In this context, a series of workshops are being conducted with collaboration between the two societies (IGS and JGS) for the growth of geotechnical engineering and fruitful interaction between researchers in both the countries. The first workshop was held in 2011 at Kochi, India, on ‘Earthquake Geotechnical Engineering’ theme, and the second workshop was held in 2015 at Fukuoka, Japan, on ‘Geotechnics for Resilient Infrastructure’ theme. The third workshop was held in conjunction with ‘Indian Geotechnical Conference 2017’ in December 2017, Guwahati, India, on ‘Geotechnics for Natural Disaster Mitigation and Management’ theme. The workshop focussed on the recent advances and the developments that are taking place in geotechnical aspects of natural disaster mitigation and management. Speakers from Japan and India presented some of the salient aspects of natural disasters and their mitigation strategies. A total of about 30 eminent researchers and practitioners from both the countries participated in the workshop deliberations.

This book titled *Geotechnics for Natural Disaster Mitigation and Management* is the compilation of the some of the expert deliberations made at the third Indo-Japan workshop held on 13 December 2017 at IIT Guwahati, India. This book is organized into 13 chapters covering the landslides and earthquake natural disasters for effective mitigation and management. Chapter 1 discusses the geotechnical and geological perspectives of The 2017 July Northern Kyushu Torrential Rainfall Disaster. Chapter 2 outlines disaster management strategies that are being adopted in India and typical geotechnical characterization aspects for earthquake disaster. Chapter 3 presents details of shear strength characterization gravel–tyre chips mixtures for sustainable geotechnical engineering through the usage and recycled waste tyres for various disaster mitigation techniques. At times, back analysis-based approaches are to be adopted to the characterization of soils through numerical simulations and analyses. Chapter 4 explains an example of the application of such an approach for determination of elastic modulus of soil. It is also essential to account for a special variation of the properties of soils for realistic analyses. Chapter 5 provides the

details of the evaluation of the spatial distribution of strength of few embankments in Japan and India through field investigation. Various aspects of landslides like integrating rainfall load in landslide warning system (Chap. 6); application of physically based models for landslide hazard evaluation (Chap. 7); and debris flow-related aspects in the case of rock fall (Chap. 8) are also included in this book. Chapter 9 describes the significance of surface and sub-surface drainage measures for efficient landslide mitigation strategies. Waterfront retaining structures including breakwater systems are being affected by earthquake and tsunami. Design aspects (Chap. 10) and countermeasures (Chap. 11) against disaster-induced instabilities are also included herein. For efficient disaster mitigation strategies, ground improvement methods play a vital role. Ground modification techniques using vibro methods (Chap. 12) and cement-based grouting are briefly discussed.

We sincerely thank and appreciate the efforts of all the expert contributors in formulating the book chapter contributions. We also thank Springer team for giving inputs for finalizing the manuscripts and publishing the contributions to spread the conglomerated ideas through this book. It is believed that this book will be a good resource for academicians, researchers, practising professionals and, especially, students of the geotechnical fraternity related to the natural disaster mitigation and management.

Tirupati, India
Kyoto, Japan

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Takeshi Katsumi

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About the Editors



Dr. A. Murali Krishna joined the Department of Civil Engineering, Indian Institute of Technology (IIT) Tirupati as an Associate Professor (Geotechnical Engineering) in May 2019. He has been a faculty member in Department of Civil Engineering at IIT Guwahati, since 2008. He obtained doctoral degree from Indian Institute of Science Bangalore, M.Tech degree from IIT Kanpur and B.Tech degree from Sri Venkateswara University, Tirupati. His research interests include: Earthquake Geotechnics, Geosynthetics and Ground Improvement, Site characterization and Numerical and Physical modelling of geotechnical structures. Dr. Murali Krishna supervised 7 Doctoral students and 24 Masters students. He co-authored nearly 170 publications of technical papers in international/national Journals and conference/seminar proceedings, including book chapters. He is a recipient of BRNS Young Scientist Research award, BOYSCAST fellowship and HERITAGE fellowship. Dr. Murali Krishna is an executive member of ISRM (India) and ISET. He is also a Member of TC 203 of ISSMGE, since 2011. He served Indian Geotechnical Society as an ‘Executive Member’ for four terms (2011–2018). Dr. Murali Krishna organised several national and international workshops and short courses. He is a reviewer for several national and international journals.



Dr. Takeshi Katsumi is a Professor at the Graduate School of Global Environmental Studies (GSGES), Kyoto University, Japan. He served as Assistant to the Executive Vice-President of Kyoto University for two years from 2012 October, and is currently Vice Dean of GSGES. He graduated from the Department of Civil Engineering, Kyoto University, and obtained his doctoral degree from the same university in 1997. He has research interests in a variety of topics of environmental geotechnics, including waste landfills, remediation of contaminated sites, and re-use of by-products in geotechnical applications. He has received several awards including the “JSPS Prize” by the Japan Society for the Promotion of Science. He has been a member of ISSMGE Technical Committee No. 215 on Environmental Geotechnics for more than 15 years, and has been the International Secretary of the Japanese Geotechnical Society (JGS) since 2014. He has delivered keynote lectures at several international conferences such. He has been involved in several projects regarding the recovery works from the 2011 East Japan earthquake and tsunami, and has been a contributing member to the Central Environment Council of Japan for the last two years.